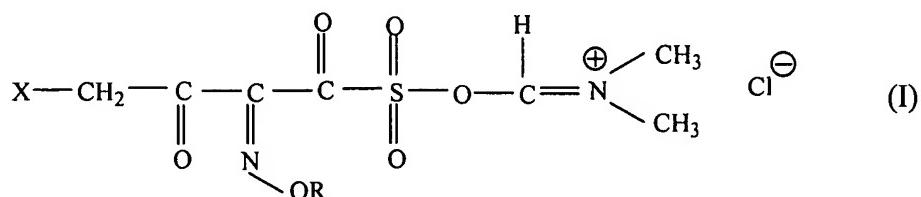


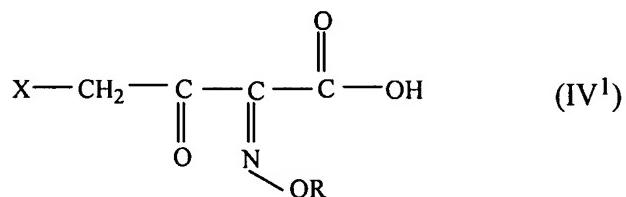
## ABSTRACT

A novel 4-halo-2-oxyimino-3-oxo butyric acid-N, N-dimethyl formiminium chloride chlorosulfate of formula (I) useful in the preparation of cephalosporin antibiotics

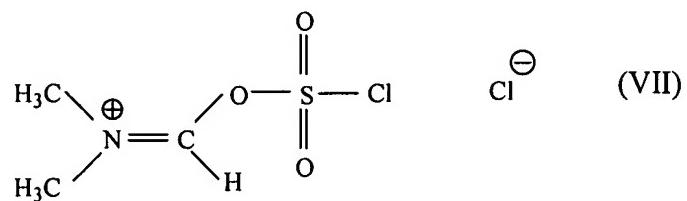


wherein

X is chlorine or bromine; R is hydrogen, C<sub>1-4</sub> alkyl group, an easily removable hydroxyl protective group, -CH<sub>2</sub>COOR<sub>5</sub>, or -C(CH<sub>3</sub>)<sub>2</sub>COOR<sub>5</sub>, wherein R<sub>5</sub> is hydrogen or an easily hydrolysable ester group. The compound of formula (I) is prepared by reacting 4-halo-2-oxyimino-3-oxobutyric acid of formula (IV<sup>1</sup>),



wherein X, R and R<sub>5</sub> are as defined above, with N, N-dimethylformiminium chloride chlorosulphate of formula (VII)



in an organic solvent at a temperature ranging from  $-30^{\circ}\text{C}$  to  $-15^{\circ}\text{C}$ . The cephalosporins that may be prepared from the intermediate include cefdinir, cefditoren pivoxil, cefepime, cefetamet pivoxil, cefixime, cefmenoxime, cefodizime, cefoselis, cefotaxime, cefpirome, cefpodoxime proxetil, cefquinome, cestazidime, ceftoram pivoxil, ceftiofur, ceftizoxime, ceftriaxone and cefuzonam.